

Claims

1. A method of selecting operational parameters of a communication network, characterised by;
- 5 searching an operational parameter space using a multiple objective simulated annealing (MOSA) process wherein;
- the objectives are based upon performance indicators of the communication network;
- 10 the MOSA process generates an archive of estimated values of a Pareto front; and
- the MOSA process employs a dominance-based energy function.
- 15 2. A method according to claim 1, wherein the dominance-based energy function, $E(x)$, is defined substantially as

$$E(x) = \mu(\tilde{F}_x),$$

- where μ is a measure defined on \tilde{F}_x , and \tilde{F}_x is defined
- 20 substantially as

$$\tilde{F}_x = \{y \in \tilde{F} \mid y \prec x\},$$

- such that \tilde{F}_x is the set of elements of \tilde{F} that dominate solution x , where \tilde{F} is the union of the current set of mutually non-dominating solutions found, with the current
- 25 solution x and the proposed perturbed solution x' .
3. A method according to any one of the preceding claims, wherein the difference in the dominance-based energy function between current solution x and proposed
- 30 perturbed solution x' is evaluated substantially as

$$\delta E(x, x') = \frac{1}{|\tilde{F}|} \left(|\tilde{F}_x| - |\tilde{F}_{x'}| \right),$$

all terms as defined herein.

4. A method according to any one of the preceding claims, wherein additional values of the estimated Pareto front are obtained by randomly sampling an attainment surface of the archive of estimated values of the Pareto front.
5. A method according to any one of the preceding claims, wherein the MOSA process may propose a perturbation to the present solution x that is scaled using one of two scaling schemes;
- i. transversal scaling
 - ii. location scaling
6. A method according to any one of the preceding claims, wherein objectives may be based upon performance indicators of the communication network from any or all of the following categories;
- i. Capacity;
 - ii. Coverage; and
 - iii. Quality of service.
7. A method according to any one of the preceding claims, wherein cost values are applied the objectives and/or the operational parameters according to a given scenario.
8. A method according to claim 7, wherein the solution with the lowest cost within the archive of estimated values of the Pareto front is chosen for a given scenario.
9. A method according to any one of the preceding claims, wherein the operational parameter values

associated with a chosen solution are incorporated within the communication network.

10. A method of selecting operational parameters of a communication network according to claim 1 and
5 substantially as hereinbefore described with reference to the accompanying drawings.